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World Forum for Harmonization of Vehicle Regulations

Working Party on Automated/Autonomous and Connected Vehicles*

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Item 12 of the provisional agenda
UN Regulation No. 90

Proposal for a Supplement to the 02 series of amendments to UN Regulation No. 90 (Replacement braking parts)

Submitted by the expert from Spain**

The text reproduced below was prepared by the expert from Spain, chairing the Special Interest Group on UN Regulation No. 90, introducing amendments to align the text in Annex 7 to the UN Regulation No. 90 with the provisions in UN Regulation No. 78, based on GRRF-86-41. It also inserts the reference to the L_6 and L_7 vehicle categories to respond to requests from the industry for type approval for the replacement brake lining assembly for vehicles category L_6 and L_7 which are included in latest version of UN Regulation No. 78. The modifications to the existing text of the Regulation are marked in bold for new and strikethrough for deleted characters.

* Formerly: **Working Party on Brakes and Running Gear (GRRF)**.

** In accordance with ECE/TRANS/274, para 52, with ECE/TRANS/WP.29/1139, para. 33 and with the programme of work of the Inland Transport Committee for 2014–2018 (ECE/TRANS/240, para. 105 and ECE/TRANS/2014/26, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

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I. Proposal

Annex 7, amend to read:

"Annex 7

Requirements for replacement brake lining assemblies for vehicles of category L

1. Test conditions

1.1. A vehicle which is representative of the type(s) for which the replacement brake lining assembly approval is required shall be equipped with the brake lining assemblies of the type for which approval is requested and instrumented for brake testing as required by UN Regulation No. 78.

1.2. Brake lining assemblies submitted for the test shall be fitted to the relevant brakes and, until a fixed burnishing procedure is established, shall be burnished to the manufacturer's instructions in agreement with the technical service.

1.3. In the case of brake lining assemblies for vehicles with a combined braking system in the meaning of paragraph ~~2.9.~~ **2.6.** of UN Regulation No. 78 the combination(s) of brake lining assemblies for the front and the rear axle to which the approval shall be directed must be tested.

The combination may consist of replacement brake lining assemblies for both axles and/or a replacement brake lining assembly on one and an original brake lining assembly on the other axle.

2. Tests and requirements

2.1. Conformance with Regulation No. 78

2.1.1. The braking system of the vehicle shall be tested according to the requirements for the vehicle category in question (L_1, L_2, L_3, L_4, L_5, ~~L_6~~, L_7) in Regulation No. 78, Annex 3, paragraph 1. The applicable requirements or tests are:

2.1.1.1. ~~Type 0 test with engine disconnected~~ **Dry stop test - single brake control actuated**

The test is to be carried out only in the laden condition. Make ~~a minimum of six~~ **one** brake application ~~at spaced increments of control force or line pressure~~ **according to Annex 3, paragraphs 3.1. and 3.2., in UN Regulation No. 78** up to wheel lock, or up to **a the deceleration under performance requirements defined in Annex 3, paragraph 3.3. of UN Regulation No. 78** ~~of 6 m/s²~~ or up to the maximum allowed control force.

Where brake lining assembly approval is required for front axle brakes the test is to be carried out on the front brakes only.

Where brake lining assembly approval is required for rear axle brakes the test is to be carried out on the rear brakes only.

2.1.1.2. Dry stop test – all service brake controls actuated

Test is to be carried out under Annex 3, paragraph 4., UN Regulation No. 78 requirements.

2.1.1.3. ~~Type-0 test with engine connected~~ **High speed test**

Only applicable for vehicles of categories L_3, L_4, L_5 **and** L_7.

Test is to be carried out under Annex 3, paragraph 5., UN Regulation No. 78 requirements.

2.1.1.4. ~~Type-0 test with wet brakes~~ **Wet brake test**

~~Not applicable to vehicles of category L_3 or in cases of drum brakes or fully enclosed disc brakes not subjected to this test during approval to Regulation No. 78.~~

Test is to be carried out under Annex 3, paragraph 6., UN Regulation No. 78 requirements.

2.1.1.5. ~~Type-I test~~ **Heat fade test**

~~Only applicable for vehicles of categories L_3, L_4 and L_5~~

Test is to be carried out under Annex 3, paragraph 7., UN Regulation No. 78 requirements.

2.1.2. The vehicle must satisfy all the relevant requirements stated in Regulation No. 78, Annex 3, paragraph 2. for that category of vehicles.

2.2. Additional requirements

2.2.1. Cold performance equivalence test

A comparison of the cold performance of the replacement brake lining assembly and the original brake lining assembly shall be made by comparing **the test results** ~~of the Type-0 test as described in paragraph 2.1.1.1.~~.

2.2.1.1. **Make a minimum of six brake applications at spaced increments of pedal effort or line pressure up to wheel lock or, alternatively, up to a mean fully developed deceleration according to the minimum requirements in Annex 3, paragraph 3.3., UN Regulation No. 78 or up to the allowed maximum pedal force for the category of vehicle in question from an initial speed as given in Annex 3, paragraph 3.2., UN Regulation No. 78.**

~~The Type-0 test as prescribed in paragraph 2.1.1.1. shall be performed with one set of the original brake lining assembly.~~

2.2.1.2. **Note and plot pedal force or line pressure and mean fully developed deceleration for each application.**

2.2.1.3. The replacement brake lining assembly shall be considered to show similar performance characteristics to the original brake lining assembly if the achieved mean fully developed decelerations at the same line pressure in the upper two thirds of the generated curve are within 15 per cent of those obtained with the original brake lining assembly.

2.2.2. Speed sensitivity test

This test is only applicable for vehicles of categories L_3, L_4 **and** L_5, **and** L_7 and shall be carried out with the laden vehicle under the **test** conditions **defined in** ~~of the Type-0 test with engine disconnected~~ **Annex 3, paragraph 3.1. and 3.2., of UN Regulation No. 78**. However, the test speeds are different.

2.2.2.1. From the results of the ~~Type 0 test~~ **cold performance test** as described in paragraph **2.2.1.1.** determine the control force or line pressure corresponding to the minimum required mean fully developed deceleration for that category of vehicle as described in **Annex 3, paragraph 3.3 of UN Regulation No. 78.**

2.2.2.2. Using the control force or line pressure determined in paragraph 2.2.2.1. ~~and with initial brake temperature ≤ 100 °C~~, make three brake applications from each of the following speeds:

40 km/h, 80 km/h and 120 km/h (if $v_{max} \geq 130$ km/h).

2.2.2.3. Average the results for each group of three applications and plot speed against corresponding mean fully developed deceleration.

2.2.2.4. Mean fully developed decelerations recorded for the higher speeds shall lie within 15 per cent of that recorded for the lowest speed.

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II. Justification

This proposal is addressing the facts that:

(a) Annex 7 to UN Regulation No. 90 is not aligned with the current text of UN Regulation No. 78.

(b) The industry is willing to request approvals for replacement brake lining assemblies for vehicles of Category L_6 and L_7, which are included in latest version of UN Regulation No. 78.